



PKG. SIZE — "L"

CASE DIM. 2.02 LG. x 1.145 W. x 0.625 DP.
 PINS: .040 DIA. x .25 LG. (NOM.) ON .100 GRID

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	± 16 volts
Storage Temperature . . .	-25°C to $+85^{\circ}\text{C}$
Operating Temperature . .	-25°C to $+85^{\circ}\text{C}$
Differential Input Voltage	± 15 volts
Differential Input Current	± 15 mA
Common Mode	
Input Voltage	± 11 volts

GENERAL DESCRIPTION

Types SA-1 and SA-2, SL-6, and FSL-6 are low-cost, high performance, all silicon semiconductor operational amplifiers, superseding earlier silicon-germanium hybrid types SGX-3, SGX-4, SGL-6, etc. These units employ the G.E. 2N2711 family of economy silicon planar transistors plus other selected silicon semiconductors, to obtain stable operation over the temperature range -25°C to $+85^{\circ}\text{C}$. While not intended to replace premium types DA-1, CDA-12, etc. in critical applications involving prolonged exposure to extreme environments, these compact encapsulated modules are entirely suitable for a large number of laboratory and commercial applications where economy is an important consideration.

APPLICATIONS

These amplifiers are primarily designed for closed-loop applications with externally applied inverse feedback. They may also be used open loop or with positive feedback as voltage crossing detectors, etc.

Type SA-1 is a moderately high gain amplifier designed for low-to-moderate closed-loop gains with external resistances in the range 10K to 50K.

Type SA-2 is a higher gain amplifier capable of improved accuracy at higher closed-loop gains. Its lower input offset current is an advantage where higher external resistances are encountered.

Type SL-6 is a high gain, high output amplifier similar to the SA-2, but with a ± 20 mA/ ± 10 V output capability, particularly useful as a driver for servo-valves and other low impedance loads.

Type FSL-6 is an ultra high speed version of the SL-6 with full output beyond 500 kc and unity-gain crossover at approximately 100 megacycles. It is specifically designed as a high speed inverter, adder, integrator, crossing detector, etc. The FSL-6 is not, however, intended to replace the SL-6 in differential amplifier and follower applications.

ELECTRICAL CHARACTERISTICS

SYMBOL	CHARACTERISTICS (@ 25°C UNLESS NOTED)	SA-1	SA-2	SL-6	FSL-6		UNITS
V_{cc}	Supply Voltage (3-wire D. C.)	± 15	± 15	± 15	± 15	Rated	Volts D.C.
I_{cc}	Supply Current Quiescent Full Output	± 6 ± 8	± 6 ± 8	± 10 ± 30	± 10 ± 30	Typical	mA D.C.
E_o	Output Voltage Range, Full Load	± 10	± 10	± 10	± 10	Min.	Volts P-P
I_o	Output Current Range	± 2	± 2	± 20	± 20	Min.	mA P-P
E_{cm}	Input Common Mode Voltage Range	± 11	± 11	± 11	± 3	Max.	Volts P-P
E_{os}	Voltage Offset Stability @ Const. Temp. (Long Term)	± 100	± 100	± 100	± 100	Typical	Microvolts
$\Delta E_{os}/\Delta V_{cc}$	Offset Voltage/Supply Voltage Stability Coefficient	500	200	200	200	Typical	$\mu\text{V}/\text{V}$
$\Delta E_{os}/\Delta T$	Offset Voltage Temperature Coeff. -25°C to $+85^{\circ}\text{C}$	± 15 ± 45	± 10 ± 30	± 10 ± 30	± 12 ± 36	Typical Max.	$\mu\text{V}/^{\circ}\text{C}$
I_{os}	Input Offset Current	± 40 ± 100	± 20 ± 50	± 20 ± 50	± 20 ± 80	Typical Max.	Nano-amperes
$\Delta I_{os}/\Delta T$	Offset Current Temperature Coeff. -25° to $+85^{\circ}\text{C}$	2.0	1.0	1.0	2.0	Max.	nA/ $^{\circ}\text{C}$
A_o	Open Loop Gain @ D. C. $R_L = 10\text{K}$	1×10^4	5×10^4	5×10^5	—	Min.	—
A_o	Open Loop Gain @ D. C. $R_L = 500$ ohms	—	—	5×10^4	5×10^4	Min.	—
f_t	Unity Gain Crossover Frequency	1.5	1.5	1.0	100	Typical	mc
f_p	Frequency Limit For Full Output (Unity Gain Inverter)	10	10	10	500	Typical	kc
Z_d	Differential Input Impedance	100K	200K	200K	200K	Typical	Ohms
Z_{cm}	Common-Mode Input Impedance	10	25	25	—	Typical	Meg-ohms
R_{os}	External Offset Voltage Zero Trim Potentiometer (Not Supplied)	50K	100K	100K	100K	—	—